

Monte Carlo Simulation for the EMTiming system

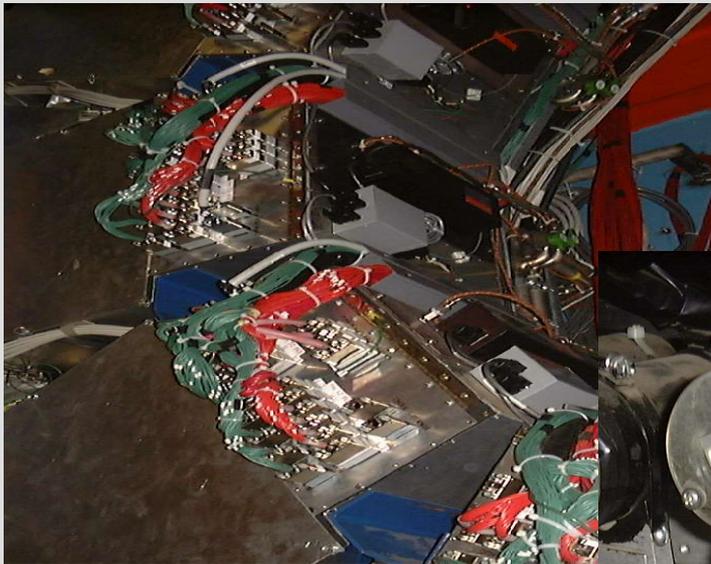


Outline

- ◆ Hardware
- ◆ Approach (Pro's/Con's)
- ◆ Modules
- ◆ Status

Hardware

- ♦ Particle **positions** measured by the **EMCalorimeter**
- ♦ The newly installed **EMTiming System at CDF** allows us to perform the **time measurements**
- ♦ EMTiming resolution is **<1.0 ns**



Approach

What to do?

- ◆ Create EMTD_StorableBank and fill it with timing information for each calorimeter tower that has energy deposited above a threshold of ~ 2 GeV (Plug) and ~ 3 GeV (Central)

Why this way? We want to run the same modules on MC files as on data

What do I need?

- ◆ MC-particle information (arrival time) and caldata information (energy deposited; needed for calibrations)

Problems?

- ◆ consider only particles which interact with the EM-Cal
- ◆ calorimeter code (“Gflash”) showers MC-particles into calorimeter; there is no MC information available after showering

Approach

Solution:

- 1) Change CalDigitizer.icc code at the point where Gflash is executed OR
- 2) Create separate module (which is run after cdfSim and Production.exe) and extract information by looping over OBSP bank (to calculate time of arrival) and Caldata (to get the energy deposit).

Approach

Which one to take?

(1)

- more precise approach
- requires change of CalorDigitizer
- need to rerun already produced MC files to get timing information in there (takes time)

(2)

- One can simply run the module on already produced MC files
- Template was available from testing the EMTiming system
- No precise information available => Don't know
 - which particle actually interacted with the calorimeter
 - how much energy was deposited (this is important for calibrations when there are multiple timing hits in one tower)

=> (2)

Modules

Template existed:

CalorUserMods/src/TDCBankSimModule.cc

CalorUserMods/CalorUserMods/TDCBankSimModule.hh

New Files in:

CalorTimeMods/src/TDCBankSimModule.cc

CalorTimeMods/CalorTimeMods/TDCBankSimModule.hh

CalorTimeMods/test/McTiming.cc

CalorTimeMods/test/run_McTiming.tcl

(not yet committed)

Usage:

gmake CalorTimeMods.nobin; gmake CalorTimeMods.tbin

McTiming CalorTimeMods/test/run_McTiming.tcl

Status

- ◆ EMTD bank gets filled
- ◆ Still need to think about a way to estimate whether a particle deposited energy in the calorimeter and how much it deposited
- ◆ Still need to implement multiple timing hits per tower; now I only take first hit
- ◆ Don't know the final timing resolution yet
- ◆ stnmaker made problems until recently... so I had no time to make plots for this meeting yet... :-)